Generators in the low voltage distribution network

VDE regulation points the way ahead for the improved network integration of decentralized power generation (VDE-AR-N 4105)

The network connection regulation VDE-AR-N 4105 created by the VDEFNNN comprises numerous content-related modifications and innovations with the objective of being able to integrate decentralized power generators better in low voltage distribution networks. The rapid increase in the installed power of generators supplying the low voltage distribution network requires innovative solutions at the interface between the electrical installation and the network. This is particularly true of the very rapid increase in the generation of electricity using photovoltaic systems. This high proportion of installed generating capacity in the low voltage distribution network meanwhile has significant relevance for network and system technology.

A summary of the most important facts

- VDE regulation facilitates network integration of decentralized generators
- The core of VDE-AR-N 4105 is network-supporting functionality to guarantee safe and reliable network operation for maximum integration of generating capacity in the low voltage distribution network
- VDE-AR-N 4105 is intended to be a component part of the technical connection conditions (TAB) of a network operator
- This technical standard provides a more reliable basis for planning, investment and action.
Important technical solutions

This VDE application rule applies for the planning, construction, operation and modification of generators that are connected to the low voltage distribution network of a network operator and that are operated parallel to the low voltage distribution network (network connection point in the low voltage distribution network). Besides basic points of view relating to the connection and operation of generators in the low voltage distribution network, it also contains concrete and in some cases new technical requirements.

Within the framework of VDE-AR-N 4105, requirements to be met by the targeted provision of reactive power by generators in the low voltage distribution network are described for the first time, with the objective of achieving static voltage stability (voltage quality).

In particular 3-phase inverter systems (e.g. PV systems) must also be reconsidered with the objective of ensuring adequate voltage quality in accordance with the requirements of DIN EN 50160 and taking account of the maintenance of the symmetrical properties of the 3-phase network.

The application rule therefore specifies the requirements to be met by „symmetrical infeed” in concrete terms. Taking account of a presumed technological reorientation in power generation from conventional power stations towards decentralized generators, three-phase inverter systems must satisfy the three-phase technical capabilities of three-phase synchronous generators in the medium term.

The maintenance of network and system stability is still of enormous significance in view of the generating capacity installed in the low voltage distribution network (e.g. about 16 GWp PV in 2010). For this reason, the VDE application rule describes requirements to be met by a frequency-dependent active power control, in order to guarantee in particular system stability in the event of overfrequency (solution for the 50.2 Hz problem).

The application rule also comprises
- requirements to be met by permitted system perturbations
- requirements to be met by the section switch and the protective devices for the section switch (NA protection)
- requirements to be met by an island network detection system
- requirements to be met by a billing measurement system
- requirements to be met by the verification of electrical properties (conformity)

Application

The VDE application rule takes effect as of 1 August 2011. Transitional periods are provided for at the beginning of the application to facilitate its implementation and introduction for all those involved. For PV systems in the low voltage distribution network, the application rule will become binding on 1.1.2012, and on 1.7.2012 for all other generators in the low voltage distribution network. The VDE application rule is intended to become an integral part of the technical connection conditions for network operators. The use of VDE-AR-N 4105, which is binding and was prepared jointly by all specialist groups involved, provides a reliable standard that gives all parties a reliable basis for action and planning.